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Haugbølle, Kim; Forman, Marianne

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COUPLING PROJECT AND BUSINESS PROCESSES: EXEMPLIFIED BY DEFECTS AND ARBITRATION

Kim Haugbølle

Danish Building Research Institute/Aalborg University, Hørsholm, Denmark
khh@sbi.dk

Marianne Forman

Danish Building Research Institute/Aalborg University, Hørsholm, Denmark
maf@sbi.dk

Drawing on a study on the emergence of defects and arbitration, this paper will analyse how project processes are coupled with business processes in construction. Linking the project processes and the business processes are crucial for performance and innovation in construction. What is less clear is the character of these linkages. This study is based on a social-constructivist approach using documentary material and qualitative research interviews with strategically selected representatives of the construction process as well as the arbitration process. This paper suggests that points of accountability on performance provide excellent points of departure for analysing the links between project processes and business processes. A number of theoretical perspectives on couplings in construction as knowledge flows, as functions and regulation, as governance, as a loosely coupled system, and as ties have been identified. In conclusion this paper has proposed an alternative perspective on couplings as constitutive, which explores and challenges the very ontologies at play when it comes to analytical units, relations and effects. Consequently, the paper has sketched out alternative policy implications when it comes to improving performance and innovation in construction, most notably by mobilising leverage to change the perception of what counts as satisfactory.

KEYWORDS: innovation, complex products and systems, organisation, quality, performance

INTRODUCTION

Defects in construction constitute a significant problem, which may account for as much as up to 10 % of the total turnover in the industry (Nielsen & Hansen 2004). A reduction of the resources spent on defects may therefore prove to be highly beneficial to the construction industry as long as the costs for reducing defects are lower than the benefits.

As pointed out by numerous authors (see e.g. Gann & Salter 2000) the coupling between business processes and project processes are crucial for performance and innovation in construction. Still, most contemporary project management theories are dominated by a perspective on singular projects, thus ignoring the history and context of the project according to Engwall (2003). Based on comparative study of the renovation of a hydropower plant and the establishment of a power transmission link, Engwall (2003) illustrates how projects are dependent on its history and embedded in an organisational context.

Drawing on a study on the emergence of defects and arbitration in construction, this paper will analyse how project processes are linked with business processes in construction. The

emergence of defects and arbitration offers a valuable site to gain insights into the fundamentals of construction since defects and arbitration represent a potential disruption of the taken-for-granted assumptions of the firm, yet defects and arbitration is a routine in construction since it happens on such a regular basis. Thus defects and arbitration open up the on-going process of linking the project and the firm for closer inspection.

The structure of this paper is as follows. First, the paper describes a backdrop of theoretical perspectives on couplings. Second, the paper introduces the research methodology of the study. Third, the paper presents the analysis of the social construction of defects. Fourth, the conclusion will summarise the findings of the study.

SOME THEORETICAL PERSPECTIVES ON COUPLINGS

In the following we will briefly introduce and discuss five different perspectives on couplings in construction: Couplings as linking through knowledge flows, couplings as functional and regulatory, couplings as governance, couplings as a loosely coupled system, and couplings as ties.

Coupling as linking through knowledge flows

As noted by e.g. Gann & Salter (2000), a major challenge for project-based firms is to link the project-based processes with the business processes of the firm. The project-based nature of construction implies that the interdependencies are primarily linked to the rather fluently, changing and ad-hoc patterns of cooperation with a rather great number of external firms. These links are important due to the relative high degree of autonomy of the individual project, while the individual projects to a large extent determine the overall performance of a firm. What is less clear is the character of these linkages or couplings.

Following the work on CoPS or Complex Products and Systems (see e.g. Hobday 1998 & 2000), Gann & Salter (2000) provides an analytical framework for understanding the construction industry as embedded in a context of both policy-making (regulatory and institutional framework) and knowledge production (technical support infrastructure). The model recognises not only actors but also activities taking place. Further, the model acknowledges not only the construction industry in a traditional sense – namely contractors and consultants – but it also includes the clients of construction as well as the manufacturing industry delivering products for construction. Within this resource-based approach, the couplings between different actors and activities are framed as knowledge flows.

Couplings as functions and regulation

The CIB Working Commissions W055 on “Building Economics” and W065 on “Organisation and Management of Construction” define the construction economic sector system as follows (Carassus ed. 2004: 10, original emphasis):

“The construction economic sector system can be defined as the organised complex of commercial and non-commercial relationships, between productive and institutional actors, taking part in the production and the management of services provided by the structures used, throughout their life cycle, as the living and working environment of a population.”

According to Carassus (ed. 2004), the testing of the approach in nine countries has clearly illustrated its strength by highlighting differences related to institutional contexts, clients’ procurement and actors. Further, the approach has identified significant similarities about the rising of services, the decreasing of construction industry weight, the heaviness of the

construction sector system, the significance of the stock and of its maintenance, and the coexistence of big companies with a very fragmented system. The economic meso-analysis approach provides us with a functional and regulatory perspective on the couplings of the construction economic sector system (Carassus ed. 2004).

Couplings as governance

An alternative perspective on the couplings as governance is delivered by Winch (2000 & 2002) in his overall conceptual framework for construction business systems. Based on Winch & Campagnac (1995), Winch (2000: 90-91) argued that although the organization of construction projects varies considerably from one project to another within a single country, nationally distinctive patterns in the organization of those projects can be identified and summarized in terms of conception, construction and control. Failing to distinguish clearly between the institutional level and the governance level of national business systems, he later revised the conceptual framework (Winch 2002: 390-391, original emphasis):

“At the system level are all the elements of the regulatory context of construction project management discussed in the earlier Editorial. This regulatory context structures the range of actions that participants on projects can take — while certain actions are standard practice, others are excluded from the business recipe. In turn, practice on projects at the actor level shapes the institutions of the regulatory context, pushing them to allow the actors on the project to innovate and deliver value for clients more effectively. The regulatory context thereby provides both constraints and opportunities. This is shown in Figure 1, which lays a system or institutional level over the actor level of the 3Cs from Figure 1 of Winch (2000).

The relationships between the actors in the system can be seen as one of competitive collaboration. They must all collaborate together in coalitions on particular projects mobilized by clients in order to achieve their aim as firms of staying in business; at the same time they compete with each other for influence at the system as a whole. These types of dynamics are found in a number of industrial sectors that rely on highly skilled professionals.”

In this revised version of the construction business system, Winch (2002) has included both a system level focusing on policy-making and an actor level focusing on the construction project. However, the analytical framework does not include knowledge institutions except indirectly through their contributions to construction regulation etc. In addition in this revised version of the construction business system, the firm has been left out as an analytical category. Further, the interaction between the actor level and the system level is only characterised in the very broadest terms as “structuring of action” and “shaping of institutions”.

Couplings as a loosely coupled system

In a review of studies on loosely coupled systems, Orton & Weick (1990) argue that most studies have a tendency to drift away from a dialectical interpretation of loose couplings and move toward unidimensional interpretation of loose coupling. Instead, Orton & Weick (1990: 205, original emphasis) argue that:

“The image that should emerge from this discussion is the following. If there is neither responsiveness nor distinctiveness, the system is not really a system, and it can be defined as a noncoupled system. If there is responsiveness without distinctiveness, the system is tightly coupled. If there is distinctiveness without responsiveness, the system is decoupled. If there is both distinctiveness and responsiveness, the system is loosely coupled. This general image is described here as the dialectical interpretation of loose coupling.”

Orton & Weick (1990: 217) goes on identifying five perspectives called voices of causation, typology, effects, compensations, and outcomes, which are then forged into a simple, sequential model in an attempt to reconceptualise the concept of loosely coupled systems.

Inspired by the work of Weick (see e.g. Orton & Weick 1990), Dubois & Gadde (2002) provides an example of the use of the concept of loosely coupled systems within construction. Dubois & Gadde (2002: 627) identifies a pattern of couplings build on two interdependent layers of individual projects and a permanent network of firms:

“The pattern of tight and loose couplings can be interpreted as a means of coping with the prevailing complexity in construction operations. The tight couplings in individual projects combined with the loose couplings in the permanent network embedded in the community of practice make it possible to come to grips with uncertainty and interdependence. In particular, it appears that the loose couplings in the permanent network provide the slack necessary to handle the tight couplings in projects.”

With this typology or metrics of tight/loose couplings in mind, Dubois & Gadde (2002: 61) concludes that the pattern of couplings among activities, resources and actors in construction seems to favour short term productivity while hampering innovation and learning.

Couplings as ties

A different, yet to some extent similar perspective on couplings is offered by social network analysis. In his seminal article “The Strength of Weak Ties”, Granovetter (1973: 1376) argues for an analysis not only of strong ties, but also of weak ties, since weak ties are more likely to link members of different small groups rather than strong ties, which tend to be concentrated within particular groups. Granovetter (1973: 1978) goes on concluding:

“Linkage of micro and macro levels is thus no luxury but of central importance to the development of sociological theory. Such linkage generates paradoxes: weak ties, often denounced as generative of alienation (Wirth 1938) are here seen as indispensable to individuals' opportunities and to their integration into communities; strong ties, breeding local cohesion, lead to overall fragmentation. Paradoxes are a welcome antidote to theories which explains everything all too neatly.”

Social network analysis has been around for more than 40 years and have offered a number of insights on the strength, closeness etc. of ties. The perspective has also been applied within construction for analysis of project management (see among others Chinowsky et al. 2008 and Pryke 2004). What are common for these studies are the attempts to quantify the couplings between different actors – if not explicitly, then it would be rather easy to quantify the relations.

RESEARCH METHODOLOGY

What seems to be common to most of these perspectives on couplings is the underlying assumption of the pre-existence of these couplings and the main focus tends to be on the effects of these couplings on e.g. productivity and innovation. Although their characteristics may be different (weak/strong, tight/loose, knowledge flows etc.) and their ontological and epistemological grounding also varies, these perspectives seem less occupied with understanding the making of these couplings as routines. We would like to introduce an alternative perspective of couplings as stabilisation of sociotechnical change or routinisation – or in other words routines in the making. Thus, below we will spell out a somewhat alternative perspective that will focus more on couplings in the making.

Theoretical framework

This study applies the social-constructivist concept of technological frames developed by Bijker (1997) as part of the SCOT theory (Social Construction of Technology). The SCOT theory is a response to technological determinism, and it argues that technology does not determine human action. Rather, social actions and technologies mutually shape each other. Consequently, sociotechnical change can not be understood without understanding how technology is embedded in its context.

The theory includes three main parts. The first part of the theory is the sociological deconstruction of sociotechnical change by applying the two concepts of relevant social groups and interpretative flexibility developed earlier by Pinch & Bijker (1984) in their now classical study of the development of the bicycle. The interpretative flexibility means that an artefact has different meanings to different groups, which in turn generates different problems to be solved. The second part of the theory is the analysis of the social construction of sociotechnical change by the processes of stabilisation and closure. The third part is the explanatory and generalising part of the theory by applying the concept of technological frames and inclusion (Bijker 1997).

The technological frame encompasses goals, key problems, problem-solving strategies, requirements, theories, tacit knowledge, testing procedures, design methods and criteria, user practice, perceived substitution function and exemplary artefacts. The technological frames guide thinking and interaction within and between the different relevant social groups. Three different configurations of technological frames can explain sociotechnical development: 1) one dominant technological frame, 2) no dominant technological frame, and 3) more than one dominant technological frame.

Performance as the analytical focal point

Projects are having a relatively high degree of autonomy of the firm. But what, then, is coupling the firm and the projects together? The answer to this question may in particular be points of accountability. These points of accountability include all interactions where the performance of the project in its broadest sense of e.g. cost, time and quality is being assessed, documented and reported between the project and the firm.

These points of accountability may be stable and recurrent like e.g. business reporting systems or enterprise resource planning systems applied by firms to monitor cost and finance of projects, EDRM systems (electronic document and records management systems) for correspondence etc., digital project webs, various company specific software tools etc. The points of accountability may also be more irregular and ad hoc, when various types of problems are encountered in the projects like the case of defects and liability issues.

Defects and liability issues are in particular interesting to focus on because they represent a potential disruption of the taken-for-granted assumptions of the project and firm. As such defects open up the on-going process of linking the project and the firm for closer inspection. A process that is often so ingrained in daily practices that it can be hard to distil. A second reason for the focus on defects is almost contradictory. The recurrent character of defects, the heavy attention on liabilities in contracting, and the institutionalised procedures of arbitration make the management of defects a fairly familiar and routinized part of project life. Thus, the emergence of defects and the subsequent arbitration process are or becomes important points of accountability that effectively link the project processes of a building project with the business processes of a construction firm.

As a consequence, this paper will suggest that points of accountability on performance (or lack hereof) for example on defects, value, cost etc. provides excellent points of departure for analysing the links between project processes and business processes.

Research design

This study used a variety of methods including participant observation, documentary methods and qualitative interviews.

First, participation observation in a two-day course for building experts in arbitration has given important knowledge on how the arbitration process is taking place, what tasks and duties the building expert is supposed to undertake, and how the building expert is being trained to conform to the code of conduct of a building expert in arbitration.

Second, documentary material has been obtained from various sources. The documentary material includes e.g. agreed documents, guidelines on arbitration, reports on arbitration and information on different types and procedures of conflict resolution.

Third, qualitative interviews have been conducted with both representatives of the various actors of a construction project (client, consultant and contractor) and arbitration system in the shape of representatives from the secretariat of the board of arbitration as well as arbitration experts. The interviews were carried out as semi-structured interviews and the themes included:

- Perceptions of what is considered defects, failures and shortcomings.
- Experience of using the court of arbitration and expert appraisals.
- Effect of the use and judgements on the firm's practice and strategies.

The interviews were recorded and transcribed in full. Eventually, the interviewees had the opportunity to comment on the transcripts. Subsequently, the interviews were analysed using a meaning condensation approach, rather than a narrative, interpretative, categorisation or ad hoc approach (Miles & Huberman 1984; Kvale 1996).

CONSTRUCTING DEFECTS – DEFECTS IN CONSTRUCTION

The Danish Building and Construction Arbitration Court was established at January 1 1973. The Building and Construction Arbitration Court facilitates dispute resolutions within building and construction according to the agreed documents for construction works, design-build and consulting services covered by AB92, ABT93 and ABR89 along with the statute of the board. Other dispute resolutions or legal measures also exist like approved appeal tribunals, private lawsuits etc. The secretariat of the arbitration board is responsible for the administration of the activities of the arbitration board, including liaison between the opponents, lawyers, building experts, arbitrators etc. The arbitration board encompasses the following dispute resolution methods: Inspection and survey by experts, expert opinions on security provided etc., normal or simplified arbitration, pre-emptive conflict resolution, conciliation and mediation.

The liabilities of consultants and contractors are usually defined according to the agreed documents ABR89, AB92 and ABT93. When it comes to errors and negligences, the

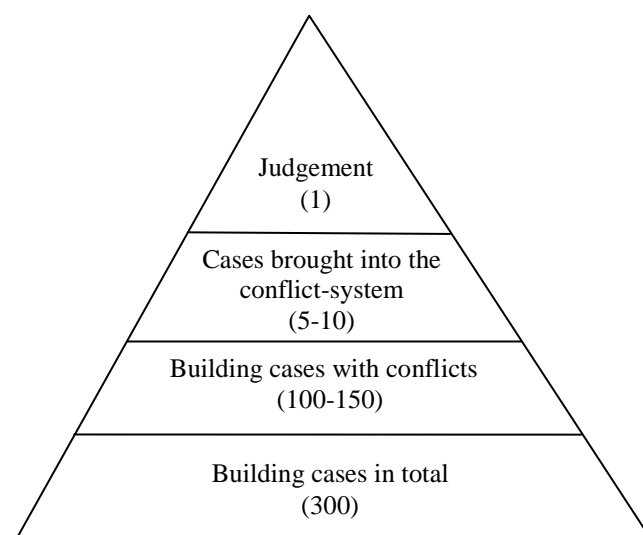
consultant are liable for damage occurring in connection with work assumed by him when such damage is the result of a lack of the necessary professional skill or care. The consultant cannot be held liable for damage arising from conditions which cannot be considered generally known in professional circles, for accidental damages, or for errors committed by the client or by others engaged by the latter (National Building Agency & Danish Association of Consulting Engineers, 1989). The liabilities of contractors are defined by the agreed document AB92 General Conditions for the provision of works and supplies within building and engineering (Danish Ministry of Housing, 1992, p. 9):

“§ 30. If the work has not been performed in accordance with the contract, with due professional care and skill or in accordance with any instructions given by the employer under § 15, it shall be deemed to be defective. The same shall apply whenever the contractor has failed to provide other services agreed upon in relation to the work.”

Building defects are considered as deviations from norms – an anomaly. The deviance is the object of an ongoing negotiation, where what is considered norms and what is considered as anomalies change over time and appears as the ongoing result of a mutual shaping process. Consequently, we will use the term 'deviance' rather than defects in our analysis to liberate ourselves from any of the connotations that is so deeply ingrained in the use of the term 'defects'.

Let us start the analysis with some empirical observations on the number of deviances. This is exemplified by the pattern of dispute resolution in one of the case firms (see Figure 1). The numbers in brackets refers to the number of building projects per year. These numbers are taken from a large consultancy firm. Clearly, the absolute numbers will depend on the size of the firm. Further, the numbers will depend on the type of firm in question. For example, the number of legal cases at a contractor is typically higher. In the contracting firm some 30-40 building projects per year was the norm. Now, the exact numbers are not that important. What matters is the scale or magnitude of disputes.

Figure 1: The dispute hierarchy in a construction firm. Source: Haugbølle & Forman (2009).



In a previous paper, Haugbølle and Forman (2009) have deconstructed the interpretative flexibility of the concept of defects or deviance, as we would prefer it, starting from the bottom and moving upwards. We followed/identified the controversies on “defects” between

the various relevant social groups in order to render the interpretative flexibility visible in relation to “defects” as well as the processes that allow the controversies to be closed. The four interpretations are deviance as normalisation, deviance as leverage/liability, deviance as a random effect, and deviance as precedent. Further, we have demonstrated how “defects” are socio-technically constructed through three main processes: concrete negotiations on the gap between expectations and realisation, setting and applying ground rules for the game of construction and arbitration, and by producing structures in the shape of norms or codes of conduct. Finally, we have argued that the construction of defects can be explained as the result of interaction between two dominant technological frames: the building frame and the juridico-legal frame. The first frame is constituted by relevant social groups like building engineers, architects etc., construction technologies etc. The second juridico-legal frame is constituted by relevant social groups like building experts, arbitration methods, arbitration courts etc. Consequently, the system of arbitration and expert appraisals along with construction practices and strategies is co-shaping a culture of deviance/defects that both intentionally prevent defects but simultaneously foster defects unintentionally.

DISCUSSION

In a schematic sense our core argument throughout this paper looks like this: Institutions like the legal system of arbitration is co-forming norms for performance, code of conduct etc. These norms along with other forces shape the behaviour of actors. The behaviour produces results and (sometimes) defects. In turn, the defects stimulate learning – correct or not. The lessons learned either maintains existing behaviour or re-shapes a new behaviour. The behaviour will reinforce norms for performance, code of conduct etc. In turn, the norms establish the foundation for institutions like arbitration. What, then, are the implications for our understanding of couplings in construction?

Before we look at that question, let us then return to the starting point that the couplings between project and firm are crucial to performance and innovation in construction (or any other project-based industry). In line with constructivist reasoning (see e.g. Bijker 1997), we may distinguish between explanandum (that, which needs to be explained) and explanans (that, which explains). Put as a simple formula, this statement reads:

EXPLANANS

Project + Firm

=>

EXPLANANDUM

Performance/innovation

The policy and management implications of above formula are rather straight-forward: If we improve the couplings between the firm and project, then prosperity will arise. If we adopt either of the previously described analytical approaches, our management strategies would fairly easy crystallise. We would improve the knowledge flows or knowledge information systems in companies (Gann & Salter, 2000), we would be counting the number and character of the ties in a social network (Granovetter 1973 and Chinowsky et al. 2008), we would clarify the functions and regulatory context in the construction economic system etc. In short, we would improve our sensitivity to the history and organisational context of projects as Engwall (2003) urges us to do.

We do acknowledge the validity of and the contribution to our understanding of construction fundamentals by each of these approaches or perspectives. We value for example the conceptualisation of ties as weak/strong and couplings as loose/tight, the inherent systemic perspective, and the focus on knowledge flows, functions and regulation.

We would however also hold that these perspectives are too limited in their scope and understanding of couplings in construction due to their unidirectional outlook on the relationship between explanans and explanandum in the formula above. What the different perspectives tend to overlook (possibly more in their actual research practice than as an epistemological grounding) is the reciprocity of the formula above. In fact, we would like to pose a more fundamental question to construction (and other project-based industries): What if the above formula is wrong? What if we have misunderstood the relations altogether? What if we are not dealing with couplings in this understanding as ties, links, flows etc. between project and firm, but rather as couplings between technological frames or sociotechnical ensembles. Thus, we would rather focus on the constitutive character of these couplings and their importance for our ontologies as we have illustrated in the briefly described study on defects and arbitration.

First of all, we would like to point out that the couplings are dynamic in character. This may be a rather trivial observation that most observers would agree upon. However, we would like to hold that being dynamic is not simply a question of changing a weak tie into a strong one or increasing the frequency of interactions as implied in social network analysis. Rather, the dynamism of a coupling implies that the relationship may be more significantly altered, or more precisely that the couplings are being reconstituted. The study on defects and arbitration has shown how the emergence of defects and the arbitration process significantly alter the relationship between the project and the firm. What starts out as a disagreement in a building project may be turned into a legal case. Further, the time frame may change dramatically from that of a more or less fixed deadline for the handing-over of the final building to the legal statute of limitations. A significant shift in actors or relevant social groups also occurs as we proceed through the four interpretations. First, building experts, lawyers, insurance companies, legal officers and arbitrators are the prominent actors. Second, although the building professionals still have a role to play, their roles as project manager, consultants, contractor etc. may be redefined as the roles of plaintiff and defendant as well as witnesses to be called to the stand.

Second, we would focus our attention on the constitutive forces at play and their impact on our ontologies on performance, innovation, project, firms etc. Consequently, the configuration of actors and arenas is kept in place through couplings that not only extends and reshapes the boundaries of the project and the firm, but also shapes what counts as satisfactory or not. Couplings are not just couplings but are the very forces that keep the network together and make the sociotechnical ensemble obdurate.

Our paper has provided a preliminary insight to some of these forces that shape our perception of performance and how these perceptions shape our actions through two dominant technological frames: the building frame and the juridico-legal frame. Put very simply, our main argument looks like this: The obduracy of “performance” or more specifically the non-performance of defects is shaped by two dominant technological frames: the building frame and the juridico-legal frame. The two dominant frames construct four interpretations of performance or “defects”: normal, leverage, random and precedent. Each of the four interpretations is constituted by a distinct setup of actors, meanings, arenas etc. Each

of these four interpretations represents some significant shifts in arenas, actors etc. as illustrated below:

From within the boundaries of the project...

To between the project and the firms involved...

To between the firms involved and the arbitration system...

To within the arbitration system and the construction sector

Third, the policy implication is not to skip the management recommendations of the other theoretical perspectives, but to supplement these or more radically to confront the limitations of these perspectives. So if we want to improve performance – lower number of defects, faster project delivery, cheaper buildings or whatever – then we would need to address those forces that shape our very perception of performance. Thus, we would (not only) be looking for improving the coupling between the project and the firm, but we would explicitly explore and challenge the very ontologies of what counts as a project and firm, and what constitutes performance and innovation etc.

This is not to say that we should not be investing time and energy in improving the couplings between project and firm, but there is an additional – maybe even alternative – but definitely very often overlooked approach, namely target the perceptions of what counts as satisfactory (or innovative or...). We can improve knowledge information systems in companies etc. but these activities are not basically addressing the core issue of what counts as satisfactory or innovative. Put differently, the baseline remains the same if we do not change it! So if we want to improve performance and innovation in construction, we would need to change that very baseline. One very practical implication of this strategy would be not to avoid taking cases to arbitration court, but to elevate appropriate political pressure and actually strive towards getting cases there in order to use them to systematically change the legal perception of what counts as satisfactory.

CONCLUSION

In sum, this paper has identified a number of theoretical perspectives on couplings in construction as: 1) knowledge flows, 2) functions and regulation, 3) governance, 4) a loosely coupled system, and 5) ties.

Further, the paper has suggested that points of accountability on performance of for example defects, value, cost etc. provide excellent points of departure for analysing the links between project processes and business processes.

The paper has analysed the emergence of defects and arbitration in construction as the result of the mutual shaping of two technological frames: the building frame and the juridico-legal frame.

This paper has proposed an alternative perspective on couplings as constitutive, which explores and challenges the very ontologies at play (explanans/explanandum) when it comes to analytical units (project/firm), relations (couplings) and effects (performance/innovation).

Finally, the paper has sketched out a number of alternative policy implications when it comes to improving performance and innovation in construction, most notably by mobilising the necessary leverage to change the perceptions in both the industry and the legal system of what counts as satisfactory.

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